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3-Way Chemical Advance Against Insect Pests

N-29676-Stanley A. Hall, (right) Director of ARS Pesticide Chemicals Research, discusses promising new pesticide with Assistant Director Elmer E. Fleck. Reports of testing from cooperating entomologists in field laboratories located throughout the United States are stacked in the background.

N-27826-Test data on more than 9,000 compounds are filed here. Punch card system enables chemist Morton Berozu to quickly sort out compounds that have pesticidal properties related to his problem. Mrs. Flossie Thompson records new data on cards.

Chemists and entomologists of the U. S. Department of Agriculture are advancing against insect pests along three chemical fronts. These scientists of the Department's Agricultural Research Service are discovering and developing more effective yet safer insecticides . . . attractants . . . repellents.

A promising new insecticide, less harmful to warm-blooded animals than any now in use, is now in final stages of development. Known as 6-chloropiperonyl chrysanthemumate, it is one of more than 900 compounds synthesized in the past year at the pesticide chemicals laboratories of ARS at Beltsville, Md. The new insecticide is only one-eighth as toxic to animals as pyrethrum and one-third as toxic as allethrin. Pyrethrum, a natural product, and allethrin, a pyrethrum-like insecticide developed by ARS chemists in 1949, have been considered the safest insecticides.

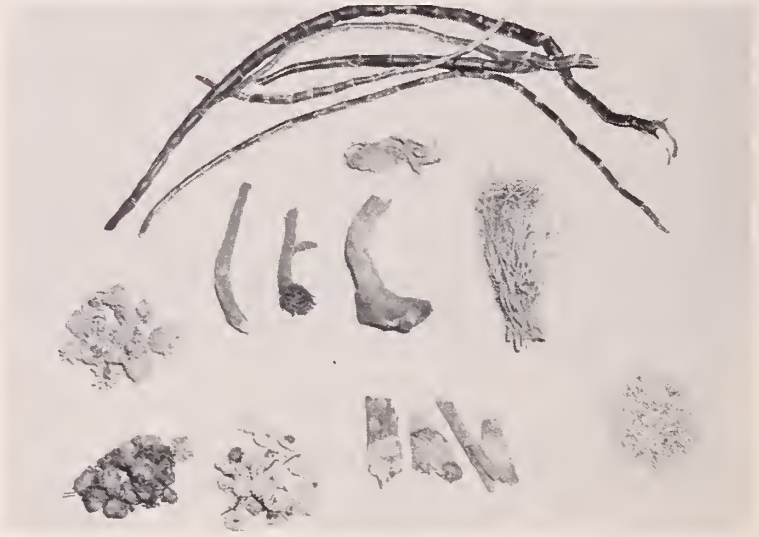
An effective attractant for the Mediterranean fruit fly is another new compound synthesized at the Beltsville laboratory. Following tests by ARS entomologists in Hawaii, the attractant replaced scarce angelica seed oil in the thousands of traps hung throughout Florida in the campaign to eradicate the fruit fly there. Traps baited with the attractant to lure Medflies enable scouting crews to map infested areas, plan spraying operations, and check on progress of the eradication campaign. Attractants are specific for each insect and the scientists are continuing their efforts to discover or synthesize compounds for use against the gypsy moth, pink bollworm, boll weevil, and other fruit fly pests.

Diethyltoluamide is the chemical name of a superior all-purpose insect repellent, newest of a series of successful repellents developed by the ARS scientists. It was primarily developed to protect military personnel from malaria and other insect-borne diseases. The repellent is now commercially available (under different trade names) for the protection of picnickers, backyard gardeners, and all people who work or play outdoors.

Before a new compound is released by ARS to the public for use against harmful insects it undergoes extensive field tests by cooperating entomologists at laboratories throughout the United States. Reports of the results are then analyzed and evaluated. The next step is to find out the proper dosage and method of application of a promising new chemical. Particle size and other physical properties are studied to develop the most effective forms and mixtures; physical and chemical characteristics relating to its use in aerosols are determined; problems of deterioration in storage of both chemical and container are solved. If an insecticide is intended for use on fruit, vegetable, or forage crops, residues on treated crops are painstakingly analyzed. The strength and rate of application recommended for a particular crop must conform with safe tolerances set by law. All this research is aimed at making the chemicals safe to use but deadly to the pest.

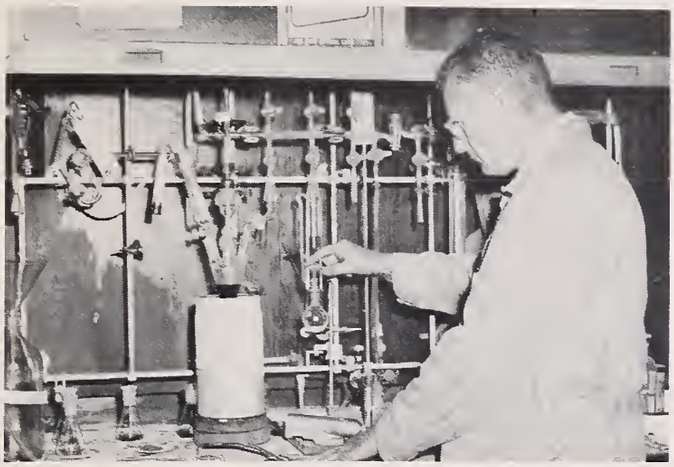
The photographs shown here take you behind the scenes in the pesticide chemicals research laboratories, where pesticide chemicals are synthesized, analyzed, and their effects studied.

N-27830-Plant and biological materials are investigated by ARS scientists for use against harmful insects. Here Martin Jacobson adjusts large extractor containing ground up organic material, as first step in separation of active element.

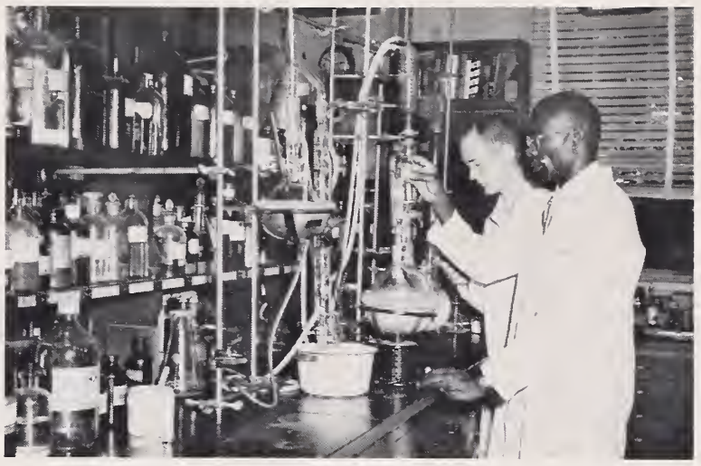


N-27834-Roots, stems, leaves, flowers, seeds, and woody parts are among the plant materials that may contain substances useful against insects.

N-27827-Chemist Martin Jacobson uses gas chromotography in tracking down volatile part of a naturally-occurring insect attractant. When active chemical factor is identified, its synthesis will be attempted.



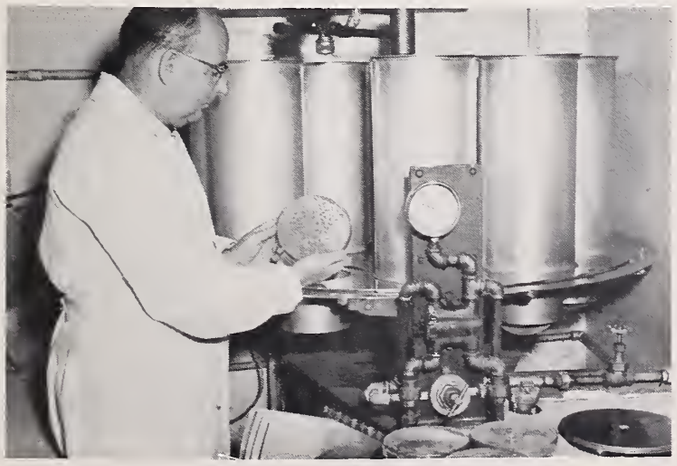
N-27822-Chemist Nathan Green adds a radioisotope in synthesizing a new insect repellent to be used in studies of its action. Hundreds of new compounds for testing as insecticides, repellents, attractants or synergists are synthesized at the ARS Beltsville laboratories each year.



N-27824-Chemists B. H. Alexander and R. T. Brown work as a team in synthesizing a new organic compound . . a process that involves a series of intricate and accurate chemical procedures.

N-27825-As first step in residue determination, chemist W. E. Westlake loads containers of treated food and solvent in tumbler. Basic information is obtained on the amount of insecticide remaining on fruits, vegetables, and forage after treatment for insect control.

N-27823-Helen G. Wheeler analyzes residues of organic phosphorous insecticides by the enzymatic method. This is one of various sensitive methods adapted or developed by ARS pesticide chemists for residue determinations.



N-27835-Entomologist Price G. Piquett places screened petri dishes, each containing 100 flies, inside cylinders into which he will spray measured dose of insecticide. The apparatus was designed by ARS scientists to facilitate testing of new insecticides.

N-27836-Roach repellent is effective if insects avoid treated half of paper lining of glass dish. Entomologist Otelia Bodenstein counts roaches in each section at intervals during test. In background are other test dishes using inverted paper containers.

N – 29095 – Structurol model of compound serves chemist Milton Schechter os a tool as he studies problem of detecting residues of new improved chemical. His job is to develop sensitive anolytical methods needed to determine residues of new chemicols.

N – 27832 – Preventing the spread of insect pests by aircraft also concerns the pesticide researchers. Here junior oid G. E. Westlake, Jr., observes fruit flies subjected to conditions of gravity found during space flights. Test tubes contoining flies are attached to centrifuge.

N – 27828 – X – ray diffraction negative of insecticide powder gives ARS physicist E. L. Gooden picture of the structure of its particles. Informotion about physicol properties of pesticides is needed to formulate effective mixtures of chemicals.

N – 27831 – Diameter of porticles of insecticide is measured by physical science oid James Jones on instrument designed by ARS scientists. (original model at left) Particle size is reloted to freedom of flow ond dispersol of insecticide by wind currents during opplication.

N – 27829 – Chemist R. A. Fulton shows visitor new new aerosol valve he designed so thot container may be used in any position without loss of gas. Volves, solvents, and propellents for use in aerosol bombs are developed at the ARS Beltsville laboratories.

Magazines and newspapers may obtain glossy prints of any of these photographs from the Photography Division, Office of Information, U. S. Department of Agriculture, Washington 25, D. C. Others may purchase prints, at $1.00 each, from the same address.